U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
OFFICE OF EDUCATION
THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL OFFICE OF EDUCATION POSITION OR POLICY.

ED057552

A Technological/Academic Approach To The Treatment of Autism

An Address

By

Richard and Edith Kobler

Presented to the National Society for Autistic Children,
Peabody College, Nashville, Tennessee, June 26, 1971.

EC 040 891E

As designer of the Talking Typewriter (TT), and other learning instruments, such as the Talking Page (TP) and the Voice Mirror (VM), I have been studying children's interactions with Educational Technology for about 11 years. Several of the children were autistic, and gained promising success in learning. Based on this experience I and my wife, Dr. Edith Kobler, are pleased to present in abbreviated form a new approach to the treatment of the autistic child.

This "technological/academic" approach begins with:

1) our new theory of Thinking, and Problem Postulation, and
2) our theory of Learning and Personality Development.

These general theories have enabled us to formulate:

3) a hypothetical description of what we believe to be one of the basic causes of autism, and
4) a hypothetical Learning Therapy, with specifications.

Our presentation will conclude with an illustrative example, including a tape recording, provided by our good friend Robert Fredericks,* of an autistic child who went through a learning experience such as we shall now describe.

The theoretical basis for the treatment approach which we propose is of the same importance as its practical application.

---

*Supervisor, El Cajon Reading Clinic, El Cajon, Calif.

Therefore, we start with what we believe to be a sound Theory of Thinking and Problem Postulation. In short, it states, that the greatest gift or art of a human being, perhaps the art that separates humans from all other beings in the universe, is the art of being able to ask a question. It is not the gift of being able to answer questions. To ask a question, as we know in schience, is far more difficult than to answer it. As a matter of fact, if a question is correctly asked it is almost answered.

Now, what does it mean, psychologically, to ask a question? To ask a question is, first of all, a negation. That sounds as though we had things backwards, in defiance of reason. However, I repeat: to ask a question means, first, a negation. A negation simply states: what now exists, my person, with my present knowledge, is insufficient, not up to date, leaves things to be desired, and what it leaves to be desired are the very things I am now going to ask a question about. So, what the capacity to ask questions really means is that the human being is the being capable of "doing the impossible," performing a bootstrap-operation, namely, to take yourself out of your present being, put yourself into another viewpoint, outside your own present being, look back at yourself, and say two things: a) "This is no good." and b) "How would that be?"

The importance of this statement will become clear when we begin to talk about two I's, the I that I am now, at this very moment, and the I, sometimes ever so little removed, the other I, that is, the "problem-I," the I that looks for the other, for the better, so that when the problem is answered, when the problem is solved, that other I becomes part of me, and I am now a new I (very frequently already in search of another I). This bootstrap process operates in a manner similar to the Hegelian dialectic, where the thesis carries within it the seeds of its opposite, the antithesis, which interacts with the thesis to produce the synthesis, which becomes the new thesis, etc.

Personality development, of course, involves our thinking processes. It was, I believe, Emerson who said that "Man is what he thinks." This may seem like an almost glib statement about anything so complex as personality development. Perhaps it would be better to say that each of us is confronted with two persons in his breast, with an inner dialogue of two people who pull themselves apart and ask each other questions. How often does it happen to you that you say: "Now, lets see, if I do this, that is going to happen, or if you do that ....?" What we have here is two I's conversing, asking and answering questions of each other. This duality is the basis for the learning theory which we set forth. It raises the question: By what means are we capable of being, in effect, mildly schizophrenic! Here we have the key point! The human being is the only being that can be consciously, I repeat, consciously schizophrenic. And only when he is consciously schizophrenic, only when he has split his personality into these magnificent conversing two I's, is he at his height, specifically, at his height of problem postulation.

Now, let us consider learning. Learning begins with a problem, posed by myself or somebody else, a problem I feel I have to solve. Now we are on more familiar ground. First, if there is anything one can say about learning itself, it is the immutable fact that it is among the most private actions man is capable of. It takes place in the innermost recesses of his mind. Therefore, the only real and valid learning processes are those which constitute a struggle; I repeat, a struggle within the learner's own mind. Often it becomes visible by the silent movement of the student's lips, or barely audible through the mumbling of the student. These are signs of the learning dialogue which the student is conducting within himself. Depending on the difficulty of the struggle, this learning process frequently demands a conscious or subconscious "splitting" of one's personality into two sub-persons, asking each other questions, and giving each other answers.

We can see that the playing of certain games becomes only an externalization of the learning process. For instance, a chessplayer will actually conduct such an inner dialogue between himself and his adversary, into whose position he puts himself, almost physically, but surely mentally. This act of "putting himself into another person's shoes," is nothing but an act of splitting one's own personality. As a matter of fact, the more successful he is in doing so, the more he is able to conduct this dialogue between his own ego and his "alter ego" (a wonderful expression).

There is an ice hockey player, Bobby Hull, about whom I have read interesting reports. The greatness of Bobby Hull is not mainly his skating skill. There are players who skate better. Others control a puck better. Some are stronger. It is Bobby Hull's greatness that he is always where the action is; somehow he knows intuitively that in a tremendous rink, players who one moment are in this place, within split seconds will skate to that place.

Bobby Hull exemplifies our ability to be somebody else. In him we see our ability to reach beyond ourselves, beyond our present personalities, to reach even into the universe beyond us. Therein is the essential factor in the human being's ability to think, to postulate problems, and to learn.

This ability of a human being to split himself consciously into two personalities yields another very abstract implication which deserves mention. The number "two" is a number preferred in the universe. The number "one" is not so hot, to be frank; there is not much you can do with a "one." But when it comes to "two," what possibilities! Please observe. We have plus and minus. You don't have plus and minus and a third, fourth, and fifth! No, no! You have just plus and minus. Further, there are north and south poles. You don't have "in between poles," you have two! The electron spin is either left or right, there is nothing in between; electrons don't change their minds so that they go somehow in between left and right spins; they either spin left, or they spin right. There is also the digital computer: zero and one, nothing else; that fact is its basic calculating premise. I don't need to talk much about the male and female; here I fervently hope there is not too much in between. It thus seems that one of the basic causative structures in the universe from its very beginnings, is not one but two of a given element, and that these two are "in communication with each other" by oppositional and yet complimentary notions. This, in our opinion, also holds true of the most advanced element of the universe, the human personality.

Now, having said this much allow me to summarize and then go on to autism.

If it is true, I repeat, if it is true that a well rounded personality, the personality of a thinker, the personality of a real human being who is capable of thought, is one who can have an inner dialogue, who can go into a corner and have the most unbelievably good time, thinking out things between him and himself, and if this is also true of the real learner--then I postulate that on the contrary, an autistic human being has lost, or not developed, the ability to split his personality. He has lost, or never had, the ability to become his own "thinking partner," to hold his own dialogue; he has no inner dialogue... he is really alone. I cannot think of any human being who is more lonesome than an autistic child because he cannot talk to or listen to himself. (If he "listens" he perhaps only hears abberations.) Now, if one lacks the capability of having a real inner dialogue, then of course, if we are correct, one also lacks the capability of learning, of real learning. We are here not talking about the ability to memorize or to echo other's voices. I know that many autistic children have fantastic memories and they can rattle things off at enormous speeds. They can echo us and, more horrible of all, with a Talking Typewriter, or in any other such situation, they will repeat a mechanical action over and over and over. If you look with an untrained eye, this may appear as a reasonable action, but it isn't, because purposeless repetition and echoing and being driven to other extremes, such as becoming an "idiot savant" who has mastered "pure" memory--these are the enemies of the inner dialogue. I would rather be a fellow like myself who has a miserable memory, but who can talk to himself, than a fellow who has the most grandiose memory, but who cannot talk to himself.

Now, yet another side: this audience should know more than others that our total society, particularly in America (but it is also starting in other places) shows possibilities of becoming autistic, because there are more and more symptoms of the fact that we hate to be alone with ourselves. We really can't stand ourselves. When it reaches the point where one stands in an elevator and must listen to some stupid music simply to have noise, noise to keep one company, to keep one's self entertained, even while one rides up four stories in a building; or when an airplane on the ground must play music because otherwise most people would not know what to do with themselves (they would have to drink--and they do), then we must make the point absolutely clear that we have not only forgotten what good company we are alone by ourselves, but we have forgotten our greatest heritage, which is the ability to say: "Wait a moment, I am deficient in this or that; this or that can be done better; I am going to play a piece of music to myself in my mind; I am going to mull things over." These things constitute the secret life of real human beings.

And so, if it is true that people with poor inner dialogues are lonesome when they are alone, and that therefore an autistic child who has completely lost the ability to conduct an inner dialogue is totally alone, then it is perhaps a logical assumption that people who have similarly "trained" themselves in loneliness, in "inner silence," are either on their way toward losing or have actually lost the ability to communicate with others, and are therefore profoundly lonely people in the midst of others. *If they can't even talk to themselves even when they need not fear social compatability problems, they cannot possibly talk to somebody else*. And, therefore, the *restoring of one's inner dialogue, the creation of one's own inner speaking partner, the transformation of one's loneliness with one's self into the condition where one is one's own excellent company*, should become the *prerequisite of being able to converse with persons outside one's own self.* *Only when man is not lonely when alone will he be not lonely when among others*.

Now, assuming all this is true, let us take one more step: If an autistic child, among other things, is one who has lost his ability to conduct an inner dialogue, and therefore has lost both the art of learning and the art of conversing with others, and if, therefore, restoration of the inner dialogue is a prerequisite to health and normalcy, perhaps *if we can restore the inner dialogue*, *the child may also then start a dialogue with the outer world*. This is the route we have chosen. We have not chosen the route of "socialization." That is just a word--semantics.

People other than autistic children have lost the art of communication. This, as we have noted, is even happening to some of us "normal" people. We say, for instance, "I cannot *talk* to that fellow." This means a loss of the ability to "put yourself into the other fellow's shoes" enough to communicate. So if two people occur positions of *total strangeness* to each other, they are, in a sense, autistic towards each other.

To return to our main theme: Socialization cannot be taught to an autistic child through direct attempts to lead him into relating with others. Inner resources must first be mobilized. When this has been done, socialization will *follow* as a natural consequence. Based on this hypothesis or theory, we are now going to postulate some specifications of a "*Learning Therapy*." In other words, *since learning*--*real learning*--*requires the splitting of one's personality in order to have an inner dialogue*, to be able to look at a problem from several sides, we are going to *take the learning process itself and make it the springboard of our attack on autism*. The moment the autistic child starts to talk about a learning process with himself and thus gets used to hearing his own "voice" (either acoustically or silently), he should be on his way towards some first communications with people.

Thus, our first task is to enable the autistic child to overcome his own loneliness by structuring his environment so that he gets an increasing thrill out of the mental games he can play with himself, the talks he can have with himself, and of course, the inner satisfaction of having learned something. Our hope is that these inner dialogues will start to snap over into "outer" dialogues.

Now, let us put some specifications on this therapeutic learning process. We begin by selecting a serious subject. We do not select some idiotic thing for this kid to do, just so that he learns something. The child learns a real subject, and reading is the subject we have selected. It is a difficult task even for some "normal children." So, the task is real.

Reading is not just any difficult task, such as tying your shoelaces, but it is a task in the field of communication; reading is a task that connects one with the thinking of other people and, in this sense, leads one out of one's self. So, while the process of learning to read is an internalization process, the result, the ability to read, is an externalization process.

How will we teach reading? By flashcards? By memorization? By asking the child to repeat the word "cat" five times from a flashcard and then to expect the child to be able to "read" the word "cat?" Never! We teach reading acoustically. We teach reading in the same manner in which the ancient inventor of the alphabet must have taught it to himself: He listened to himself. Using our ability to put ourselves in another's place, but thinking in modern terms, we can imagine how it might have been. Perhaps he said: "To the devil with all these thousands and thousands of purely optical flashcards or hieroglyphs, each standing for a thing or an event in this universe. In this manner everything I want to convey I must paint first. This is a rotten way of talking to each other, even on papyrus!" He did something fantastic: by purely listening to himself, something like the following occurred to him--probably in a flash--"Every word I say, every word I hear coming out of my mouth, I can analyze, take apart into just a few sounds--maybe 20, 30, 40 or 50--but certainly no more than a few dozen. I will never again have to deal with tens-of-thousands of different symbols. This goes not only for my own speech, but that of anybody else and for speaking not only in my native tongue, but in any other language known to me. I can take language apart into these few dozen sounds, because all of them come out of human mouths, which are capable of just so many sounds!" Thus, he "acoustically digitalized" human language.

So we now follow the ancient master. We teach that when you *speak* with proper pronunciation you can *read*; when you advance from babytalk to conscious speech and you are capable of analyzing your own spoken words, you can write them down on a piece of paper. In the process you learn also to speak better.

Our teaching approach also involves the use of *Educational Technology,* such as a "Talking Typewriter." What we do *not* need in this process is emotion, be it "patronizing loving," or the whip or a frown--it is hard to say which is worse. No, our approach is to teach the child to read by having the child work mostly *alone* (but without his ever being lonely!). Working mostly by himself, he will know that when he learns something, *he* has learned it *by himself*, with himself, in privacy, and through his own strength. And if he makes a mistake, nobody but he will know, because it is not going to appear in print. He can make a lot of mental mistakes, try to depress a lot of keys, but they will not depress let alone print anything that is erroneous. Thus, his "error-dialogues" will be private, within his own chest and he is not going to be punished by even looking at his own printed mistakes.

Our particular Educational Technology (the Talking Typewriter), is usable in a quadrosensual and trisensual manner. First of all, we deal with the "lazy L-L senses:" "Looking" and "Listening." They are the more passive senses, requiring little letter-sound "f."

Children, in general, love to ask "tactile questions." Looking down at the keyboard, they love to pick out now this, then that, then still another key. Instead of verbally asking "What is this?" by simply depressing the desired key, they provoke an audible answer. This is an actual dialogue, started by the student's visual sense when he looks down at the keyboard and visually selects a particular key (1st sense), asks the question tactily by depressing that key with a finger, and then listens to the answer given by the instrument instantly and in highly understandable speech (3rd sense).

Reversly, the student must also be given the opportunity to give a "tactile answer." If the instrument asks a question, such as, "Where is the "f"-key?" the student, having listened to the question (and perhaps having also looked at an "f" shown on the screen), will now visually scan the keyboard, visually find the "f"-key, and, finally, give the "tactile answer" by depressing the "f"-key and producing a large "f" on the typewriter paper, thus getting a visual confirmation of the correctness of his answer.

And now, last, but not least, somewhere in this whole operation, there must be a link to the voice coming out of the loudspeaker of the Talking Typewriter and the student; there must be a subtly introduced human being in-the-flesh who (standing outside the booth and observing the student) *mixes* his voice with that of the Talking Typewriter, so that the so-called "machine voice" and the "life voice" become, for all practical purposes, one.

We have now reached the point where I am going to very rapidly summarize, and then present an actual case. According to our concepts, learning is a dialogue between the I and the other I, and if autism, at least in part, consists of a breakdown of the dialogue between the child and other human beings, then perhaps, the very first step in attacking this symptom is to get the child to engage in an *internal* dialogue, specifically a *learning dialogue*, even *before* he is encouraged to engage in dialogues with other people. According to our hypothesis, an autistic child is a "*reversed schizophrenic*" because he *lacks* the ability to split his personality for the purpose of holding meaningful learning dialogue with himself. It is also our hypothesis, as explained earlier, that, in the deepest sense, it is only possible to hold a dialogue with *another* person when one is, at least to a degree, capable of *taking on that other person's personality*.

The love of autistic children for almost unending repetition of the same action with a given "thing," points toward the fact that they have lost the ability for real learning because such self-hypnotic repetitions (as in echolalia) dull the mind rather than "stimulate new associations," or start a dialogue with one's self on a higher plane.

This phenomenon became obvious within minutes as we observed several autistic children in their "free play" with the Talking Typewriter keyboard. After a very short while, they either started to repeat a certain pattern of key operation (with the correspondingly monotonous printed and audible answers of the Talking Typewriter), or they went so far as almost continuously, and seemingly never endingly, to depress one single key (out of some 50 choices).

Now follows a crucial episode which we observed very recently when we worked with an autistic child at the El Cajon Reading Clinic, in El Cajon, California.

You must visualize the setting. The autistic student sits alone in a booth confronted only by the keyboard and exhibitor-facilities of the Talking Typewriter (bold face printout and rear-view projector); the machine "talks to him" through a loudspeaker, the position of which is known to him. Thus, when an observer outside the booth (watching the student through a one-way mirror) picks up the intercom-telephone and starts to talk to the student, not only through this same loudspeaker, but with more or less the same frequency response, loudness, etc., as the "machine voice." Thus, a true mix of so-called machine and human speech impinges on the student but is recognizable to him initially only as a "machine-voice."

Now, in the actual case under discussion, the child became "enchanted" with the "space-bar" of the keyboard and operated it with seemingly never-ending repetition, causing the Talking Typewriter to announce the word "space-bar," "space-bar," etc., etc., with equal monotony. Being the observer, I asked the kid through the intercom-telephone to "stop playing with the space-bar." The only reaction was that while I shouted, "Stop it," he would momentarily stop operating the space-bar, but would continue immediately after a pause and continue as before. In a very minute way, however, this could already be regarded as a faint beginning of some sort of a reaction on the side of the student.

The next step consisted of my announcement over the intercom-telephone that if he, the student, continued to play with the space-bar, I would turn off the machine. This announcement was also of no avail; he resumed operating the space-bar after the end of each announcement. Then, I actually turned the machine off. For a short while he still tried to depress the space-bar, but without results. He then gave up and sat still, almost motionless.

He was then told that when the machine was turned on again, he should play with any key other than the space-bar. This had no effect; he proceeded again immediately to play with the space-bar. I turned the machine off as rapidly as possible, but not rapidly enough to prevent him from operating the space-bar once or twice. He was again given the same instruction: "Play with any key other than the space-bar," and then the machine was turned on again. However, this time the sequence of events was altered, because as soon as the student made his first attempt to depress the space-bar, I turned off the machine before he could execute his action. I had "intercepted" his action. This procedure was repeated several times until the student and I were bathed in sweat.

Finally, the "break-through" came. The student, being unable to satisfy his desire for monotonous repetitive actions, put or "rested" his finger on another, the "upper case" (or "shift" key) while the machine was shut off. However, the very moment I turned the machine on again, the student not only did not depress the "upper case" key, but transferred his finger with incredible speed from there to the "space-bar" and, because I was momentarily flabbergasted, succeeded with several depressions of the space-bar before I was able to turn off the machine.

Instantly after shutdown, the student shifted his finger and rested it on the "upper-case" or, as I shall now call it, the "fool-key," because this key was supposed to fool me, the observer. The machine was now turned on again and the student started again to shift his finger rapidly to the space-bar, but this time I was able to turn the machine off before the student could actually depress the space-bar; again, I intercepted his attempted action. This game was repeated several times in an almost "heated manner."

The following points are important. Negatively, it is again of great significance that the autistic student rested his finger always on the exact same alternate (upper case) key, and not on any other; this proves that even under conditions of stress and at the start of a "breakthrough" in the form of a game, the autistic student's desire for monotonous repetition, meaning for "non-learning," for "non-dialogue," was still extremely predominant.

Positively, however, there was not the slightest doubt at this point that a very solid, if restricted, communications channel between the "observer-machine mixture" and the autistic student was established, because an actual game was being played of the most subtle kind: the autistic student opened up one-half of the acoustical-verbal communication channel. He listened to an order and, while he did not answer verbally, he carried out the order, at least momentarily and in a fooling manner, tactily, by resting his finger on the upper-case "fool-key." Even more importantly, he speculated (and rightly so) that his silent, but definite, tactile and visible action, or "answer," of resting his finger on the "fool-key" would provoke my reaction of turning on the machine. And, having really succeeded in provoking this reaction, he tried to reward himself further by attempting "to beat" my action of turning the machine off before he was able to operate the space-bar.

We have no other choice but to characterize the above interaction as an "audio-tactile dialogue." True, not a single word was uttered by the autistic student, but answer he did, unmistakably, clearly and extremely rapidly, not with his mouth, but with his index finger.

What is the most important progress made so far within the person of the autistic student? When the student rested his finger on the "fool-key," at that moment he was able to split his his personality and to put a portion of his ego into that of the observer; he was talking to himself: "I know what you think; you think that when I have my finger on this uppercase key, I will really operate the uppercase key; you think that in this manner I am really going to obey your order to play with a key other than the space-bar; and therefore you are going to turn on the machine, but when you do, I am going to fool you, because I am going to be right back at the space-bar!"

The student must have held some such dialogue with himself in order to execute the above series of complicated actions.

It is this dialogue, silent though it was, which took place in the student's mind, between him and his observer-transferred ego, which constituted the first dialogue, in a true sense of the word, between the student and somebody else. If, for the moment, only one of his fingers gave visible answers, and the clattering of the typewriter, as activated by the student, constituted "audible answers," the overall significance is total; here was an answer, as sure and as definite as an answer could be. Also, most interestingly, the answer was not too difficult for the autistic student to give, because it was not necessary for him to give up what Bettleheim would call "part of his fortress" in order to speak audibly, for someone to hear. He thus was not shamed or coerced (he had a choice) into doing the one thing which he could not yet do, because his capability for conducting an inner dialogue was not yet on firm enough ground for a verbal response. The system put a potential inner speaking-diablogue in motion, which permitted him to "speak" to the outside world with his fingers.

This play between upper-case and space-bar continued for awhile--some two days longer--until I threatened the student over the intercom-telephone that I would turn the light off in the booth (in addition to turning off the machine) unless he would play with keys other than the space-bar and uppercase. This warning made no impression whatsoever. The light was turned off and the student instantly jumped off his chair, whereupon I instantly turned the light on again and exhorted the student again to play with other keys.

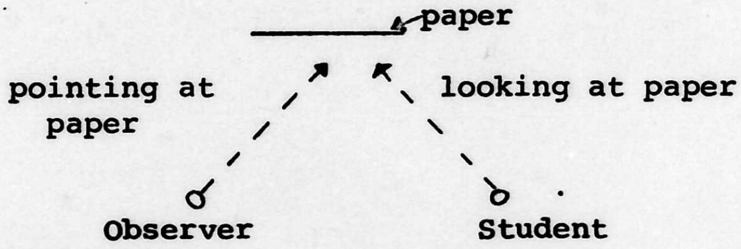
To no avail. At this point I asked the student over the intercom-telephone: "Do you want me to turn the light off again?" There followed an instantaneous and vigorous shaking of his head signifying unmistakably the exclamation, "No!" Here again was an answer, this time executed not with his index finger, but with his head, and here again was manifested the student's capacity for transferring part of his ego into mine, confirming (knowing) that I would really turn off the light.

The following day the student was put on a didactic portion of the Talking Typewriter program, in which letters and/or words are exhibited on a screen and pronounced by the instrument, and in which the student is challenged to find and to operate the corresponding keys and thus type the programmed material. (During this phase of the Talking Typewriter program, only the "correct" key is operable at any one time; all others are physically blocked.) The student did rather poorly until the instrument asked him to depress the "space-bar" (because at that moment the program happened to call for it). He instantly identified the command and instantly found and depressed the space-bar (but this time on command of the instrument, meaning that this time his will and that of the instrument were in harmony)--the instrument instantly advanced to another task, asking him to find another key. It is every significant that from that moment on he obeyed several commands of the instrument and found several letters on the keyboard without hesitation.

It is now clear that in this lesson the student achieved a "positive switch of the game." The autistic rhythm and posture had been broken. Although on the previous day the student's answers constituted responses as clear as they were now, they were then of a negative or obstructive sort. The game he played and the answers he gave were such as not to obey the man-machine commands, but to "beat them to the punch." The next day when the machine for the first time asked him to depress the space-bar, it was at that moment that the wish of the machine and his own coincided, and he realized that the game did not need to be played negatively, but could be switched into a positive collaboration. It is due to this switch that he then obeyed, in rapid order, several other orders of the instrument. At this moment there could be no question that the student had correctly answered audible commands in a silent yet clear and decisive tactile manner, and that, therefore, one could start to talk about a real and coherent positive dialogue between him and a human voice as reproduced by the instrument.

It was at just this moment that a human observer, Supervisor of the Reading Clinic, Robert Fredericks, who had taken over the post of observer from me, had the intuition to open the door of the booth, enter, and point to certain words on the typing paper that the student had just typed, asking him to pronounce this or that word. It was finally, at that moment, that the previously mute student opened his mouth and answered audibly in an attempt to read the words. Although these first oral answers were not yet very clear (the student expressed the words only partially) they were clear-cut oral responses of the student to oral questions by another human being standing next to him in the small booth of the Talking Typewriter. However, the student did not look at Mr. Fredericks; he looked at the paper in the typewriter; he did not directly speak to Mr. Fredericks, but he spoke about the subject matter in front of him, keeping his head straight forward, talking to Mr. Fredericks in a triangular relationship using the medium of the typing paper:

(TOP VIEW)



It was the *learning-object* which linked the student to Mr. Fredericks, in a triangle of student, Talking Typewriter, observer. There was as yet no "reason" for looking at Mr. Fredericks; it was enough for the student to hear his voice and to respond to it over the medium of the words typed by the student and displayed in front of him.

Moments later Mr. Fredericks took the student out of the booth of the Talking Typewriter, and *sat in a small adjoining room at a table with the student*. The student was seated right next to him, and in front of both of them (again in "*triangular* *formation*) was the very same piece of paper on which the student had previously typed the few letters and words. Again, in this new setting, the student responded audibly, if not very clearly, to the observer's questions about what the student had learned to type.

Having thus had true oral communications for the first time, the observer then completely switched the subject matter from a difficult learning task (reading words which he had just learned to identify) to one where the observer was reasonably sure that the pupil would be familiar with the symbols presented, namely, numbers. He took a large piece of paper, wrote on it a very large "2" and asked the student: "What's this?" while pointing to the number. The student answered audibly and clearly: "Two". At that point, the observer threw this piece of paper on the floor, rapidly took another one, wrote another number and repeated "What's that?" Unhesitatingly, the student gave a loud and correct answer. This was repeated many times, with different numbers, and with increasing speed and excitement on both sides. Not only did the student frequently shout the answer, but he smiled and obviously got enjoyment out of this procedure.

Without going any further with this particular case, it is obvious that the final true audible responses from one human being to another were the result not of any kind of "socialization attempt" or of any surreptitious tricking of the student to communicate with another person, but it was the clear result of an abstract learning process. Rather than external, it was an internalization process, namely the ability to communicate with one's self.

Let me now tell you something about this particular student. His name is Alan Graham. He is the son of Dr. Graham, a medical doctor, who is in the audience and who has provided me with the following facts: Alan is now a little over 5 years old and was, until a short time ago, for all practical purposes, a mute autistic child. Until his 5th birthday he spoke a total of 3 words (one of which was the word "helicopter"). Recently, around his 5th birthday, he started to echo words, but otherwise remained uncommunicative. He was, of course, many times diagnosed as autistic. Alan was brought to the El Cajon Reading Clinic near the end of February, 1971, a time when my wife and I were there to conduct some experiemental Talking Typewriter programming seminars. I worked with Alan during his first four days in the Talking Typewriter program, about 1/2 hour a day. Then Mr. Fredericks took over. As of today Alan has spent a grand total of 20 hours on the Talking Typewriter with Mr. Fredericks, who has advanced the learning process we have described much further.

Mr. Fredericks has brought a tape with him from El Cajon, which was recorded last Wednesday, June 23, 1971. (Incidentally, I would like to take this occasion officially to thank Mr. Fredericks for his fine efforts, and also to thank Drs. Campbell and Mary Goodwin for their efforts in this field, with and without Talking Typewriters.) This tape is a recording of an exchange between Alan Gramham and Mr. Fredericks. On June 23, 1971, just prior to the recording of this conversation, Alan had been working with the Talking Typewriter and had typed quite a few letters upon its command. The tape starts with Mr. Fredericks holding the paper on which Alan had typed. Pointing to certain letters, he asks Alan to pronounce their corresponding letter-sounds. During the first minute of the tape, Alan, in rapid succession, pronounces 16 letter-names and the corresponding letter-sounds; twice he makes mistakes, twice Mr. Fredericks draws Alan's attention to such mispronunciations, and twice Alan corrects himself and gives the correct pronunciation. Then follows this conversation:

Mr. F.: Good! Hey, you are doing good. Before you go home tonight, I'd like a song. I'd like a song. Take the microphone.

Alan: Pronounces a letter-sound.

Mr. F.: No, I want a song.

Alan: (mumbles the beginning of a song)

Mr. F.: What about the "Farmer's" Song?

Alan: (half singing, but speaking quite rythmically) The farmer in the del. The farmer in the dell...
(he misses the next line of the song, then continues:)
The farmer in the dell.

Mr. F.: Good, good. You did so well tonight. You sang songs; you typed; you told me the sounds of the letters and the names of them--now, what would you like to do? ....Hm? What would you like to do now?

Alan: Work on the typewriter.

Mr. F.: What do you do on the Typewriter?

Alan: You read.

I don't think there is much more to add. We believe we have developed a promising technological/academic approach to the treatment of the autistic child, and hope many others will follow in Alan's footsteps--by reading and by finding a way out of the "empty fortress."